Weekly Summary Report
USEPA Oversight, Sauget Area 1, Sauget, IL
WA No. 239-RSBD-054V / Contract No. 68-W6-0025

Week Ending Friday, October 15, 2004

This report summarizes the Remedial Investigation/Feasibility Study (RI/FS) fieldwork conducted by Monsanto, Solutia, and their contractors from October 9 through October 15, 2004 at Sauget Area 1 Sites. The current RI/FS work consists of a dense non-aqueous phase liquid (DNAPL) Characterization and Remediation Study. CH2M HILL provided field oversight on seven days during the week.

Contractors Onsite

- Golder Associates (consultant for Monsanto/Solutia)
- Groundwater Services Inc. (consultant/contractor to Monsanto/Solutia for the DNAPL Characterization and Remediation Study)
- Philip Environmental (support subcontractor to Groundwater Services Inc.)
- Prosonic Corporation (drilling subcontractor to Groundwater Services Inc.)

Work Performed This Week

Groundwater Services Inc. (GSI) and Prosonic Corporation (Prosonic) were onsite during the week conducting work for Task 4 of the DNAPL Characterization and Remediation Study Work Plan (GSI, April 2004), Soil Sampling and Installation of Piezometers. Golder Associates (Golder) was onsite during the week managing fieldwork on behalf of Monsanto/Solutia. During the week, three soil borings were drilled and bedrock piezometers were installed.

Soil Boring / Installation of Piezometers

Prosonic drilled soil borings and installed piezometers into bedrock cores at three locations during the week. The work was conducted under the direction of GSI on behalf of Monsanto/Solutia

Soil borings were drilled and piezometers installed at the following locations during the week:

- A1-13 at Site G
- A1-14 at Site G
- A1-15, downgradient of Site G / boring A1-14

Prosonic used sonic technology to drill the soil borings at Sauget Area 1. A 4-inch core barrel was utilized to advance the boring and collect samples. Subsequently, a 6-inch override casing was advanced to support the borehole. Additionally, a 7-inch override casing was used in the waste/fill areas to isolate the waste. Boreholes were drilled five feet into competent bedrock and continuously screened for the presence of non-aqueous phase liquid (NAPL).

Soil Logging and Field DNAPL Screening Tests

Soils were logged, continuously sampled and tested during drilling operations. Each 10-foot core was examined using the following field measures:

- Visual and olfactory observations to log soil and geologic conditions and to visually screen for the presence of NAPL
- Head-space analysis of each 2½-foot interval of core using a Photoionization Detector (PID) to screen for organic vapors
- Sudan dye soil testing vials, which indicates the presence of oil in the tested volume of soil
- FLUTe™ strips, a dye-impregnated colored ribbon, directly applied to the soil core, which visually indicates the presence of NAPL

The field screening results and observations are summarized in Table 1.

Drilling of boring A1-13 on Site G was initiated on October 9 and completed on October 10. At this boring, elevated PID readings were found between 11.5 and 34 feet below ground surface (bgs). Waste was encountered between approximately 5 and 19 feet bgs, and included wood debris, metal wire, and rubber shavings, often coated with a black oily matter. An odor and potential indication of NAPL was observed at and directly below the waste intervals, with a sheen visible and an oily substance observed to be oozing from the core at approximately 24 feet bgs.

The A1-14 boring was advanced on October 11. Elevated PID readings and a strong odor were noted throughout the boring. Waste was encountered between 5 and 10 feet bgs and included fibrous materials, metal fragments and wood debris, some of which was coated with a black oily substance. A dark brown or black oily residue was observed throughout much of the boring, appearing as a sheen, staining, or in some intervals free product (as indicated by the pooling or seeping of oily liquid from the soil core). Ninety-two percent of the Sudan dye tests performed yielded positive results.

Boring A1-15 was advanced on October 13. During the week, the location of boring A1-15 was agreed upon between USEPA and Monsanto/Solutia to be due north of boring A1-14, after field observations at A1-14 indicated the presence of NAPL. The field screening of the soil cuttings at boring A1-15 did not visually indicate the presence of oil; however, an odor was observed at approximately 110 to 112.5 feet bgs, along with a slippery residue on the cuttings.

Soil Sampling

GSI collected one soil sample from each 10-foot interval of soil core to be submitted for laboratory analysis of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and total organic carbon (TOC). Each 10-foot soil core was sectioned into 2½-foot intervals, and the interval with the greatest evidence of potential contamination, based on field screening results, was selected for laboratory analysis. Chemical analyses of soil samples will be conducted by Severn Trent Laboratories in Savannah, Georgia.

Additionally, three to four relatively undisturbed samples were collected from each boring using a split-spoon sampler and brass liners to contain the sample. The samples were frozen on dry ice and wrapped in plastic for storage. Three relatively undisturbed samples from each borehole, representing the shallow, middle, and deep-hydrogeologic units (SHU, MHU, and DHU) will be analyzed for physical properties including porosity, bulk density, and grain size. For each fill area, one relatively undisturbed sample from each of the waste interval, shallow, middle, and deep-hydrogeologic units will have DNAPL mobility tested. Additionally, three to

four samples from each site will be analyzed for pore fluid saturations using the Dean-Stark procedure. The chemical and physical properties analysis of all split spoon samples will be conducted by PTS Laboratories in California. The specific analyses conducted on each of the split spoon samples collected will be determined following review of the chemical analysis results of the soil samples.

Piezometer Installation

Piezometers were installed during the week at A1-13, A1-14 and A1-15. The piezometers were constructed to expose the screen to the bedrock core and the interval directly above bedrock in the DHU. Each boring was drilled approximately five feet into rock and the well was screened for 15 feet above total depth. Piezometers were constructed using 2-inch diameter stainless steel screen with a 0.010-inch aperture and 2-inch diameter stainless steel riser.

Piezometer construction proceeded by pouring sand directly into the borehole annulus around the well screen. Sand was poured to a depth approximately 2 feet above the top of the well screen, followed by a bentonite chip seal of at least 3 feet in thickness. The 6-inch override casing was retracted from the borehole as the filter pack and bentonite seal were placed. A cement-bentonite grout was used to fill the borehole annulus from the top of the bentonite seal to ground surface.

The remaining surface completions were installed at seven piezometers this week: A1-01, A1-05, A1-06, A1-12, A1-13, A1-14, and A1-15. During the week, Philip Environmental placed concrete jersey barriers around the piezometers after installation to provide permanent guards from damage at each location.

Well Development

On October 9, GSI, with the support of Philip Environmental, continued development of the piezometers that have been installed thus far at Sauget Area 1 sites as part of the Task 4 DNAPL Characterization and Remediation Study. Seven piezometers were developed during the week: A1-02, A1-01, A1-04, A1-18, A1-06, A1-09, and A1-05. Piezometers will be developed in order from most likely to be 'clean' to 'dirty' based on field screening of the soil cuttings during drilling.

Following measurement of the static water level in the piezometer, well development proceeded by surging the well screen and pumping at least 300 gallons of groundwater from the well. Water quality parameters including pH, specific conductivity, temperature and turbidity were measured during development and monitored for stability. The water purged from each well at the end of development was noted to be clear with low turbidity.

On October 9 and 10, GSI attempted to develop piezometer A1-03, located at the center of Site H, but development ceased as significant drawdown of the water level was noted in the well. On October 11, using a tremmie pipe and potable water, Prosonic flushed out silts and fine sands that had accumulated within the piezometer screen and riser. Subsequently, development commenced at the well without drawdown, but an apparent obstruction was encountered approximately 107 feet below the top of casing. Beneath this depth, only narrow diameter objects (generally less than 2 inches in diameter) could advance to the total piezometer depth of 118 feet bgs. After reviewing the field observations at A1-03, USEPA communicated their preference to Monsanto/Solutia that the well should be replaced, but agreed that the well could remain in its current condition if the Sauget Area 1 Group could demonstrate that the well could serve its intended purpose during the DNAPL survey. Representatives of Monsanto/Solutia decided not to replace A1-03 this week, but they did agree

that the well would be replaced if it was found to be compromised during later stages of the DNAPL survey.

Investigation-Derived Waste (IDW)

Solid IDW from each borehole was placed in 55-gallon drums, with soil cuttings from waste intervals placed in separate drums. Phillip Environmental transported IDW drums to the Judith Lane field facility, where solid IDW from the 'non-waste' intervals was transferred into a roll-off box. IDW from the waste intervals will be characterized separately. Liquid IDW used during drilling and well development was collected at each borehole and transferred to a 'frac-tank' located at the Judith Lane facility.

Health and Safety

Initial drilling at each borehole location within a waste/fill area commenced with all personnel donning Level C Personal Protective Equipment (PPE) including respirator and Tyvek® chemical retardant suits. An exclusion zone was established around the drill rig and sampling area within which Level C PPE was required. Drilling at boring A1-14 at Site I proceeded to total depth with personnel donning Level C.

The breathing zone was frequently monitored using a calibrated PID to check organic vapor concentrations throughout drilling operations. Additionally, a large fan was utilized to ventilate the drilling platform as an engineering control to minimize potential organic vapors in the breathing zone.

Work Anticipated Next Week

GSI plan to complete well development at the remaining six piezometers: A1-03, A1-08, A1-13, A1-14, A1-15 and A1-16. After at least a one week interval following well development, fieldwork for Task 5 of the DNAPL Characterization and Remediation Study will begin, including the NAPL survey of the 18 installed piezometers, and, if applicable, NAPL recovery tests.

TABLE 1
Field Screening Tests and Soil Boring/Piezometer Installation Summary
SA1 Weekly Summary Report, Week Ending October 15, 2004

ID	Site	Date Installed	Approx. Bedrock Depth	Screen Interval	Date Developed	Significant Observations	Odor	FLUTe ™ Strip Tests	Sudan Dye Tests	Significant PID Readings
A1-3	Site H	Sept. 10	100'	100-115'		None	None to slight	All negative	All negative	331 ppm within waste at 8-10'
A1-2	Site H	Sept. 12	107'	98-113'	Oct. 9	None	None to strong odor	All negative	3 positive results (either few red droplets or staining in jar) at 58-60', 63-65', and 68-70'	538 ppm within waste at 8-10' 50-52': 471 ppm, 58-60': 233 ppm
A1-16	Site G	Sept. 14	116'	106-121'		Black staining at ~27'	Odor within waste, slight odor up to 70'	All negative	4 positive results (either few red droplets or staining in jar) within waste at 3-5', and 8-15'	Readings between 50-100 ppm at 28-30, 43-45', and 63-65'
(Location near existing LNAPL well, EE-11)										
A1-11	Site I	Sept. 15	116'	106-121'	Oct. 7	None	None	All negative	1 positive result (red specks, adhered to sediment particles) at 103-105'	None
A1-8	Site I	Sept. 23	111'	102-119'		Oily film at some intervals. A sheen and/or dark brown to black droplets of oily residue visible in some intervals.	Odor observed throughout borehole	All negative	31 of 38 tests (81%) positively indicated oil in soil, (red film/droplets/stain or pink colored ball). Noteably – between 0-10' (surface) and 107.5-111' (two intervals above bedrock) the results were negative.	Max. result (957 ppm) at 5-7.5' interval. 36 of 39 tests (92%) were >100 ppm. Noteably – two intervals near total depth (105-110') had slightly lower results (61 and 67 ppm)
A1-18	Dwngr Site G	Sept. 24	115'	106-121'	Oct. 10	None	Slight odor observed between 5-65'.	All negative	6 of 33 tests (18%) were positive. Results were marginally positive (slight pink color on ball).	Max. result (295 ppm) within waste at 7.5-10'. 11 of 42 results were >50 ppm, all between 5-45'.
A1-4	Site L	Sept. 25	110'	100'-115'	Oct. 10	None	Slight odor observed between 27.5-30'.	All negative	All negative	136 ppm within waste at 12.5 to 15'

ID	Site	Date Installed	Approx. Bedrock Depth	Screen Interval	Date Developed	Significant Observations	Odor	FLUTe ™ Strip Tests	Sudan Dye Tests	Significant PID Readings
A1-7	Site I	Sept. 26	111'	103'-118'	Oct. 7	None	None	All negative	3 of 22 tests (14%) were positive (all three with few red droplets in jar but only one with pink ball).	None
A1-10	Site I	Sept. 27	112'	104'-119'	Oct. 7	None	None	All negative	All negative	None
A1-9	Dwngr Site I	Sept. 29	111.5'	104'-119'	Oct. 11	Dark oily streaks observed in water in 25-27.5' interval.	Odor observed from 25-82.5'.	All negative	8 of 30 tests (27%) were positive (red droplets and staining in jar, ball stained pink).	Max result (383 ppm) at 25-27.5' interval. 8 of 41 tests (20%) within soil boring were >100 ppm.
A1-17	Dwngr Site G	Sept. 30	NE	10'-25'	Oct. 7	None	Slight odor from 24.5-25'.	All negative	All negative	None
A1-12	Dwngr Site I	Oct. 5	112'	105-120'	Oct. 8	None	Slight odor observed largely from 45' to 112'	All negative	All negative	Readings of 30-120 ppm between ~35-70' Slightly elevated results above rock (10-60 ppm) between 102-112'
A1-6	Site I	Oct. 7	109'	103-118'	Oct. 11	Oily film, smears or sheen in waste intervals up to ~35'. Sheen observed next to organic material at ~60' (charcoal) and ~72' (wood)	Slight odor observed throughout borehole[2]	All negative	One positive result (red ball) at the 17.5-20' interval.	Max. result (978 ppm) at 30-32.5' interval. 19 of 34 tests (56%) were >50 ppm, generally at intervals between 15-70'.
A1-1	Site H	Oct. 8	106.5'	98.5-113.5'	Oct. 10	None	Slight odor between ~15-20'	All negative	All negative	None
A1-5	Btwn Sites[1]	Oct. 8	109'	100-115'	Oct. 12	None	None	All negative	All negative	None
A1-13	Site G	Oct. 9/10	115.5	100.5-115.5		black oily residue in waste from 5-15'; NAPL was observed oozing from core at ~24' and as an oily sheen from 15-29'	Odor from 15-29' with slight odor to ~76.5'	All negative	2 of 18 (11%) tests were positive: 19-24' intervals (red layer)	Readings from 34-313 ppm between ~11.5-26.5' Slightly elevated results between 29-34' (3-17 ppm)

ID	Site	Date Installed	Approx. Bedrock Depth	Screen Interval	Date Developed	Significant Observations	Odor	FLUTe ™ Strip Tests	Sudan Dye Tests	Significant PID Readings
A1-14	Site G	Oct. 11	122'	107-122'		Black, oily, free product observed at intervals 35-55' and 85-105'; black residue/staining observed throughout much of core.	Strong odor (not measured at all intervals[2])	All negative	33 of 36 (~92%) tests were positive (red, pink, and/or visible hydrocarbon layer)	Elevated readings throughout most of core (3-235 ppm)
A1-15	Site G	Oct. 13	117.5'	102.5-117.5'		Slippery substance with slight sheen at 108-112' interval	Odor from 105-112.5'	All negative	All negative	None

Notes:
All depths are in feet below ground surface
Dwngr – indicates well location is downgradient of the waste/fill area for each Site
[1] Boring is located between Sites G, H, and L, east of Dead Creek
[2] No odor/olfactory observations in waste intervals due to Level C PPE (respirator).

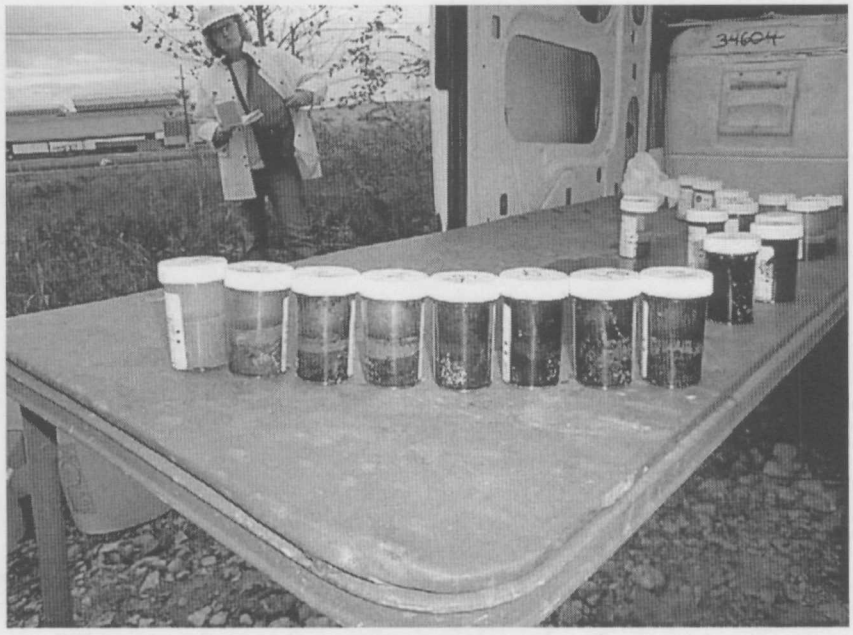
Photos from October 9, through October 15, 2004:

Drilling at boring A1-13, Site G (October 10, 2004).

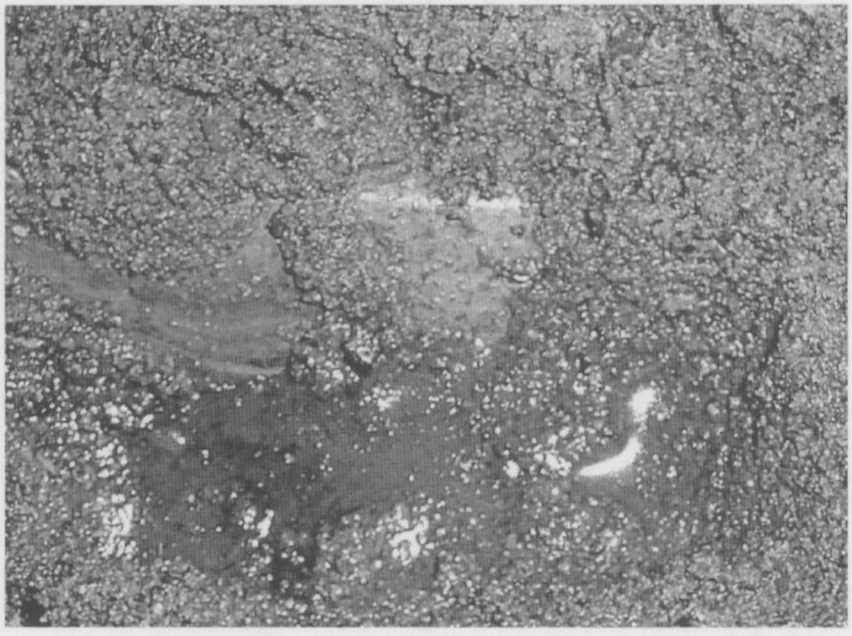
An oily residue and sheen was observed at approximately 24 feet bgs at boring A1-13, Site G (October 9, 2004).

Prosonic flushed silts and fine sands from piezometer A1-03 using a tremmie pipe and potable water (October 11, 2004).

Waste observed at boring A1-14, Site G, included a fibrous material and areas with a black oily residue (October 11, 2004).



Sudan dye tests at A1-14, Site G, were predominantly positive – i.e. red (October 11, 2004).



Potential indications of NAPL at A1-14, Site G, included black staining, smearing, and sheen, with a dark material that often appeared to sink beneath more watery-liquid (October 11, 2004).

Sampling soil at A1-14, Site G (October 11, 2004).

Preparing to install the surface completion at A1-5 (October 14, 2004).